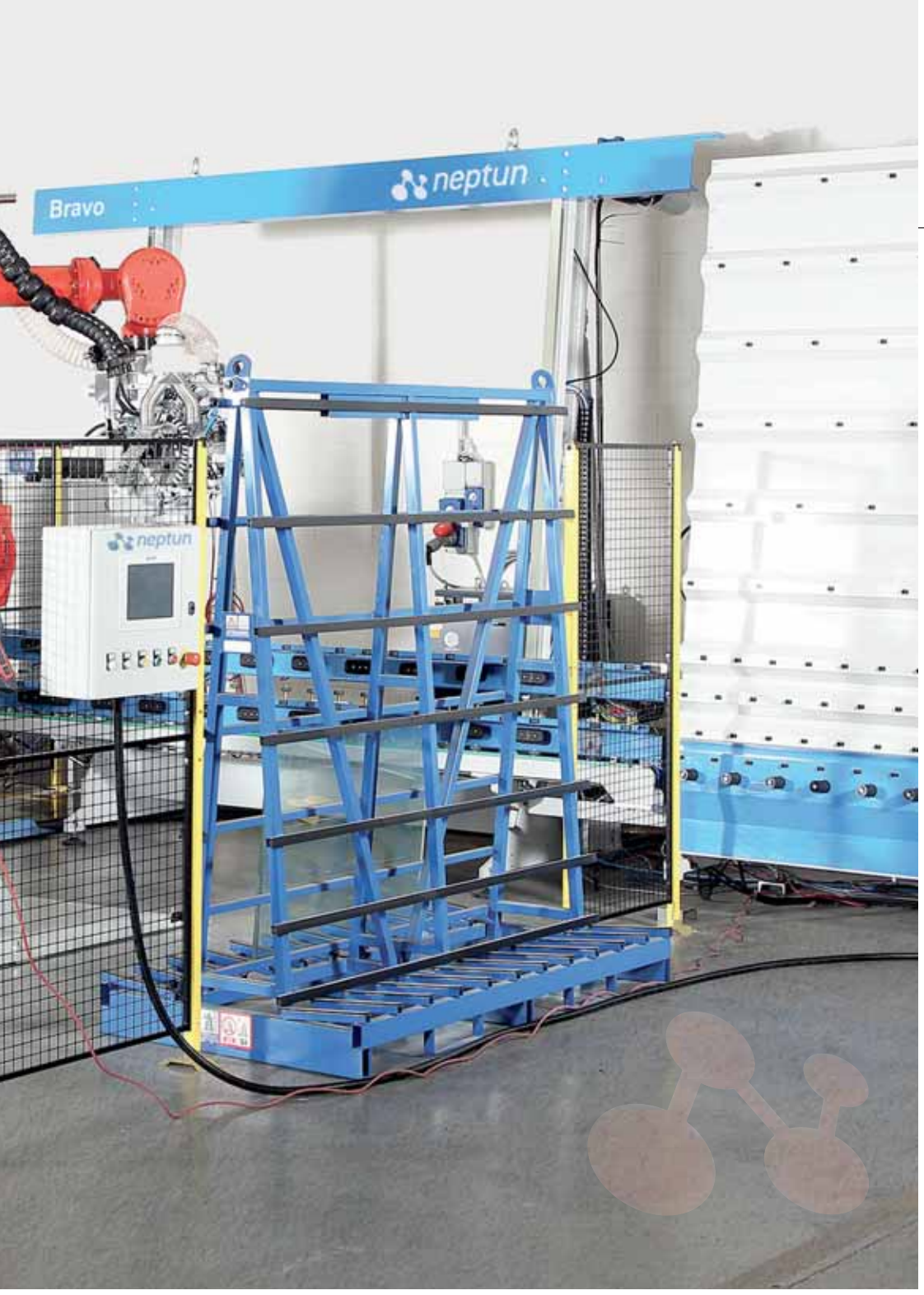
Neptun

CUSTOMIZATION ON AN INDUSTRIALIZED SCALE



During *Glass-Technology International*'s recent visit to Neptun, located in the area of northern Italy, Stefano Bavelloni and Matteo Rolla spoke about motivations and expectations, as well as methods and challenges.

Glass-Technology International recently spoke to Stefano Bavelloni and Matteo Rolla about the most recent developments of Neptun's technology, always driven by a strong combination between market requirements, professional know-how and entrepreneurial intuition.

While everybody is busy conforming to the new working methods in today's industry - Smart Factories and Industry 4.0.,- Neptun, relying on a complete range of machines that already comply with the latest rules, keeps on pursuing its original mission of developing solutions that offer a competitive advantage through innovation and improvement of performances: creating new perspectives on traditional processes, to make glass processing 'better'...

At the latest Vitrum exhibition in Milan, Neptun presented not just brand new equipment: Bravo-seam, which is an automated system for glass processing, but even a completely new division, Neptun Automation.

Matteo Rolla

The research in the field of automation started at the end of 2016. At that time, robots were obviously already being used also in

the glass industry for the transport and handling of glass sheets. Several companies were already promoting their solutions for automated loading and unloading of glass processing equipment, developed in close collaboration with external companies specialised in integration of robotic systems.
Neptun, instead, wanted to enter the automation industry creating a specific department here in the company, with a team of qualified people, with highly specialised expertise in robotics, in order to be able to develop customized and flexible solutions completely owned - and financed - by the company itself. So the software is completely developed in-house.
Moreover, we did not just want to have robots for the transport and handling of the glass sheets, but we wanted to introduce automation in other types of processes.
The mission of this division is to develop **intelligent solutions** combining the typical features of robotic industrial processes *(high productivity, quality and precision)* with the *flexibility, ease of use, and costs optimization* required in all manufacturing companies.

Stefano Bavelloni

When we put together our team "**Neptun Automation**", we started to study how the cinematics and 'freedom of movement' of robots could be used in glassworks. At the same time, we carried out research on the idea of 'dry' grinding for glass edges - which is a request that we had received and which caught our attention. Bringing together the findings of these studies, we found out that robots can be used for glass processing, in particular seaming, with an extremely interesting outcome in terms of costs, speed, quality and flexibility, a real **technological breakthrough**!

Dry processing

Dry processing, i.e. without the use of water to cool down the glass and the wheels during the seaming process, leads to several important advantages.
One of the most immediate ones is the fact that it allows you to work in a clean and dry environment, without having to deal with troublesome sludge caused by water-cooled seaming processes. So there is no dirty water to be collected and cleaned and the absence of water on the machine actually also prolongs the working life of the machines.
Dry processing also enables to work in-line avoiding the need for pre-washing before going to the washing machine. Another advantage is that the glass sheets are and remain clean and dry, and thus they can be processed directly in line - but we can also prepare 'off-line' batches ready and stored on glass racks without need to be washed and dried.

If you don't use water, then how do you manage the glass powder that is generated by the seaming process?

Stefano Bavelloni

The dust is removed by a powerful suction system and transported through a group of self-cleaning filters. The dust is then collected in a special collector, which can be cleaned very easily and with minimal effort, without creating any kind of pollution in the factory waste water system. This makes the equipment also environmentally friendly.

Matteo Rolla

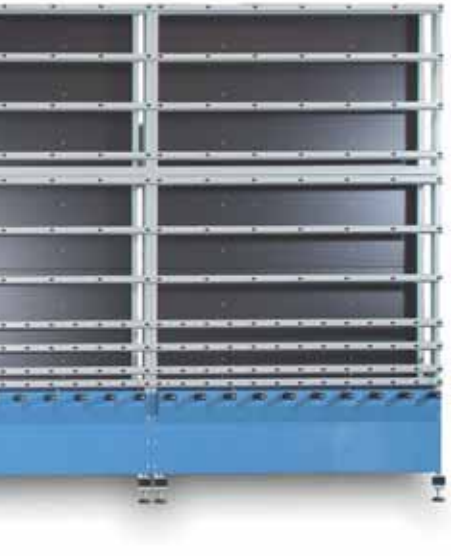
As a matter of fact, we were surprised ourselves by the optimal results of this suction system, we

expected we'd have to clean the machine and the environment from time to time and thus incorporated an additional external dust aspiration system into the system. Well, in 4 months of continuous testing on the machine, this additional system never needed to be used, the working area is and remains clean!

Without water, how do you avoid overheating of the wheels and of the glass?

Stefano Bavelloni

It's a combination of a series of features: the binder used for the wheels and their level of abrasion, speed, pressure, etc. Obviously, it also depends on the amount of glass that needs to be removed, for example 5 millimeters is impossible to handle with this system!



What about the grinding wheels - are they static or orientable; diamond or abrasive?

Obviously, with a view to complete control of the process, and considering the absolute innovation of the dry processing, this project also involved the development of specific tools. These are innovative cups wheels with abrasive technology, which guarantee constant quality, with an even arris width from the beginning to the end of the glass border and balanced performance from the beginning to the end of the wheel life.
The costs involved for these tools are one of the unexpected characteristics: extremely low costs of only 0.0045 ¢/metre, and long working life: at least for 8,000 metres without deforming!
All this was achieved over a period of 12-14 months, including four months of uninterrupted tests in our factory.

And what about the quality of the seaming process?

Quality aspects are certainly a crucial part of this innovation. In fact, comparing dry processing by Bravoseam with cup abrasive wheels to traditional peripheral diamond wheels with V-shape, there is a clear improvement in quality, also at microscopic

level, with an important reduction of chipping and no overheating of the surface.
In addition to the seaming process, Bravoseam can execute also - at the same time as the seaming operation - cornercutting or, alternatively, edge deletion, without compromising speed!

Also "simple" handling features

Our anthropomorphic robots can obviously also be used for glass handling. Bravoseam can be used in-line: the glass comes into the line and is measured, processed and sent out automatically, or can be transported to the line via racks, where the different processing steps for the different packs of glass are input, and the robots can pick up one glass sheet at a time and put them into the line.
If there are problems of space, the robot can be installed near the line and can become a 'corner-type' transfer machine, with a space-saving 'L' or 'U' shape layout.
The Bravo series also includes the model Bravoload, which is designed just for handling and transport of glass, in combination with Neptun machines or machines from other manufacturers. This model can be compared to what is offered by our competitors, although once again with superior speed and flexibility.

What drives Neptun in this relentless research and innovation?

Matteo Rolla

No other company of our size invests so much in research and development, no one else has brought so many new machines and features to the market in just a few years. The glass pre-processing market, especially for polishing and washing, is actually a rather static market, many machines are still made exactly like 30 years ago. The innovations are mostly limited to small adaptations and the use of electronics, which do not change the substance of the processing.
Neptun instead, was founded with the explicit objective to actively seek new solutions to work better, increase quality, increase

profit margins, reduce costs, ..
Neptun wants to bring into the world of glass something that will leave its mark, which will be remembered. The ownership of the company, and most of the collaborators, come from an important experience in another company which, in the 80s and 90s, really marked a turning point in the sector, and that's the thrill that still drives us.

That's an ambition that requires great courage, it demands fatigue and commitment!

Matteo Rolla

Every new project requires significant financial investments, without having the certainty of succeeding. It requires efforts, which involve all the company departments, not only the technical office for engineering or production for assembly, but also the sales office for the definition of quotation texts, presentations to the sales team, purchase, accounting. Surely without all projects and prototypes we continue to develop, the company could live more quietly, as the other companies of our size do, and certainly we could make more money. But Neptun prefers to get involved, take the risk, sometimes on the edge of madness, to bear all the costs that come from innovation. We know it's worth it, and we already have plenty of small and big success stories to strengthen our perseverance.

What advantages does the customer get from all this?

The customer is the first one who benefits from all this! Neptun's innovations bring an important competitive advantage to the customers. Market benefits from the introduction of a real process innovation that is not just another machine that works in exactly the same way as other existing models.
We remember some true innovations of Neptun, introducing real new functions: starting from the system **Ecosave** for energy reduction in the drying of glass sheets, the patented system **Edge to Shape** allowing to square the glass and control the final geometry on the straight-line edger Rock, up to **Cornercut** which integrates automatic cornercutting in the washing process, and finally the vertical NC processing centres **Quick**, based on a concept that divides into 2 machines a process that is usually carried out on a single working center, increasing speed and quality while significantly reducing costs for both initial investment and maintenance.
In the past three years we have extended our product range, completing it with **specific functions and versions that further enhance the most valuable features of each machine**.
For example, the vertical work centres of the series **Quick** have entered the area of architectural glass, moving from machines to process glass for doors, furniture and partition walls, to those for large-sized glass sheets. The higher need for automation of this industry segment is effectively dealt with by the high-speed and high-performance features which are intrinsic to the Quick series.
All the technical solutions that have enabled the Quick series to become the market reference for 'vertical machining for interiors' are brought back and amplified in the new architectural applications.
The rotary tools magazine of Quickdrill T8, for example, can change the drilling tool whilst positioning the axes, reducing the execution time between two holes of different diameters to only 8 seconds, even on the 2800mm sheet.
Or let's take the DCS tool penetration control function that optimizes the processing speed of the countersinkers for spider holes, or finally the milling process with locked glass, even more critical for quality and speed when moving heavy and large glass.
The new Quickline is also designed to be integrated with robotic loading and unloading work islands, further expanding the possibilities of automation and integration, which have always been subject of great attention by Neptun, and that fit perfectly into the current concept of Industry 4.0.

Tornado: dedicated versions of horizontal washers for specific applications

Starting from the well-established version Tornado and based on our experience, we have developed a series of models of horizontal washers dedicated to specific applications, like digital printing, white goods, lamination, ultra-thin hi-tech glass, etc.
These models have been designed specifically to guarantee an optimal result taking into account the particular requirements of these specific industry environments: Tornado LT, for example, is designed specifically for the high-tech sector, to process glass sheets as thin as 0.5mm; the white goods industry, on the other hand, requires high speed, up to 15 m/min, and maximum integration with quality control systems in order to guarantee a constant level of cleanliness of the water.
These machines are not customisations of the standard washing machines, but dedicated mod-

els, which have been engineered starting from a specific context, and with a very precise goal, according to Neptun's industrial approach.

Industrial approach

Neptun is one of the few companies with this size that builds its products following a precise quality method, which firstly involves the definition of the requirements; these lead to the technical specifications, the engineering development (risk analysis, manuals, exploded drawings, technical files, ... the entire project). It involves a series of precise tests to verify the correspondence of the final product to the initial requirements and guarantees the traceability of what has been done.
Artisanal companies make modifications *ad hoc*, in the workshop, to adapt the machines to what the buyer needs at that moment. It is certainly faster and cheaper (in that phase), but it does not allow us to go back to what was done, as it does not allow organized innovation and growth like what we do at Neptun.
Do not get me wrong, when you are small the 'artisanal' method is less expensive and faster to adopt, but the industrial approach is part of Neptun's DNA. We have always worked in very organized and international manufacturing environments and there is no other way we can do it.

How do your machines adapt to the recent revolution of Industry 4.0?

Stefano Bavelloni

Industry 4.0 has always been part of the game for Neptun! Neptun's machines were born 'industry 4.0-ready': we have always given priority to automation, reduction of consumption, integration, traceability as essential parts of the process to improve production: functions like water quality control on the washers, Quick-service for remote assistance, Ecosave for the reduction of energy consumption, smart and intuitive control panels have been implemented and fine-tuned since the very beginning of Neptun, so when the actual "Revolution 4.0" started, we were already conform to it.

Neptun Srl

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ADVANCED PROCESSING SYSTEMS

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